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Process improvement: Scarce resources make prioritizing a must

Existing or potential problems, outside agencies key determinants

It would be nice if all quality issues could be solved at once, but the truth is that improvement is an evolutionary process. Since you simply can't fix everything at the same time, this places a premium on the ability to set priorities, quality experts say.

"There are limited resources, so an organization *has* to prioritize; the quality professional will help facilitate that prioritization," notes **Patrice L. Spath**, RHIT, health care quality consultant with Brown Spath & Associates in Forest Grove, OR. "The limitation applies to both human resources and financial resources, but the biggest cost of conducting QI projects is the human resource cost," she says.

"There are limited resources in hospitals, and you have to use them wisely, particularly the budget," adds **Judy Homa-Lowry**, RN, MS, CPHQ, president of Homa-Lowry Consulting in Canton, MI. "Accordingly, you clearly need to think about the cost benefit when it comes down to corrective action," she explains.

"We simply don't want to waste resources and effort," notes **Dorinne L. Peery**, MT (ASCP), RN, patient safety program manager, quality management, at Lovelace Health Center in Albuquerque, NM.

Besides, "everybody needs a goal; you need to determine what those goals should be," observes **Marie Pears**, RHIA, CPHQ, quality coordinator at Meadville (PA) Medical Center.

Knowing priorities must be set is the easy part; determining what they should be is not quite so simple. Quality professionals

Key Points

- Decision-making body or individual a key variable in prioritization.
- Start with more obvious QI areas to develop a comfort level.
- Is it harder to motivate staff to study issues that *might* become problems?

note that several different variables can affect the selection process.

"We look at both internal and external data, and at literature like *Sentinel Event Alerts*. In addition, we look to our own policies and procedures. We also have internal data from patient safety suggestions left on our hotline," Peery says.

"No. 1, you want to make sure you address those issues that are going to have the largest impact on patient safety," Homa-Lowry says. "Of course, you need to have a good source of data and information, then what you look at are the obviously required elements of regulatory agencies; but instead of just taking them at face value, try to put some data behind them."

Some of those agency requirements can be a bit abstract, she says. "For example, if you're looking at operative and invasive procedures, you may want to look not only at high-volume, high-risk procedures, but perhaps at outliers as well. I say, try to apply trim points to outliers; this will allow you to examine the larger population and what improvements you can make in that population. Your other systems — risk management, case management, and so on — may already be taking a look at the same things, so you will not have to duplicate that process," Homa-Lowry adds.

"You can use the old QI standard of high volume, high risk or low volume, high risk," Pears says. "Or an outside agency can set the priority; right now, that would be patient safety. Perhaps an incident that occurs in your facility could set a priority, such as surgery on the wrong side or a medication error."

"The ideal would be that the priority flows from your strategic planning process for the organization," Spath says. "The organization sets strategic performance improvement goals; most organizations have set some sort of goal, such as improving the safety of patient care. Generally, that comes with objectives, like reducing medication errors, falls, or the chances of wrong-site surgery. Or the goal may be complying with the Joint Commission [on Accreditation of Healthcare Organizations's] national patient safety goals. It could, however, be other topics of interest, such as what the community says it wants, what competitors are doing, and so on."

Spath agrees with Homa-Lowry, however, that goals set by outside agencies can be very abstract. "The Joint Commission has for a number of years asked organization leaders to set strategic quality goals. But it may just say, 'improve the quality of patient care.' The people in the organization then need to operationalize that goal and make their own objectives. What should have occurred at the top may need to occur at the departmental level. A nurse, for example, may identify the areas where there are specific safety improvement opportunities," she adds.

Spath's comments bring up the key point that quite often the prioritization process is dictated by who makes the decisions. In some cases, that can be less than ideal. "Your board could set priorities, but they're looking at things from the outside," Pears notes. "But here they are set by individual department managers, committees, or by the board."

Priorities should be set according to the policies of the institution, she continues. "Here, we say if you find a need, you can put it on your priority

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list and work it from there." As QI areas are identified by departments, the manager creates a priority matrix, where different quality areas are assigned a point range. **(See example, p. 64.)** When the matrix is completed, the points are added up and the total tells the staff whether the problem should be looked at immediately, or whether it's time to move on to something else.

"Physician involvement is critically important," Spath notes. "And you're much less likely to get that involvement without commitment from senior leadership of the medical staff. For example, if you're going to look at illegible handwriting [without such a commitment], it won't get fixed."

At Lovelace, "we have a patient safety steering committee that is chaired by our chief quality officer — an MD," Peery says. The committee meets once a month and discusses, among other issues, quality improvement priorities.

How the process plays out

With such a wide range of potential subjects and a diversity of decision-making mechanisms, is that variety reflected in the subjects on which different facilities choose to focus?

Well, not exactly. *Healthcare Benchmarks and Quality Improvement* inquired about different facilities' initial failure mode and effects analysis (FMEA) projects, and there was some similarity in the responses.

"I would say probably half of the people choose some component of the medication administration process," Spath says. "It could be ordering, selling, dispensing — any step. Basically, it's because of media attention and because it's a known area."

Some facilities, she continues, focus on processes that relate to national safety goals. "We've seen a lot on wrong-site surgery — failure mode and effects analysis on the process of identifying patients and surgery sites. Others have done them on equipment alarms. The national patient safety goals are based on known problematic areas, so it still comes back to the same process."

"The first FMEA we did, and the only one we've done so far, was on epidural pumps," Pears says. "We had a near miss that could have been harmful to the patient."

The next one will go a totally different way, she says. "We've put together the total of all the incidents that have been reported through risk management, and took it through our patient safety committee. The committee said we should look at some piece of the medication administration process, such as the validating process," Pears adds.

"Our very first one was done in June 2001 on the inpatient medication dispensing system," Peery reports. "We had joined an IHI [Institute for Healthcare Improvement] collaborative, and that was prescribed as part of it. Our second was on suicide precautions; basically, the source was the *Sentinel Event Alert*. At that time, the Joint Commission said it was going to do surveys based on the recommendations in the alert."

After the project was completed, she notes, the Joint Commission decided it would *not* base its surveys on the alerts.

Sometimes, it pays to devote some creative thinking to the prioritization process. For example, Spath suggests, you might want to look at issues such as redundancy, or processes that cross organizations.

"The [recent tragedy at] Duke [University Medical Center in Durham, NC] brings up processes that cross organizations," she asserts.

"Basically, the prioritization process allows us to determine where we hope to get the biggest bang for the buck; that might come from looking at processes that cross organizational boundaries — for example, the transfer of critical patients from one organization to the next," Spath says.

"What I typically see in organizations is a lack of checks and balances," Homa-Lowry adds. "That might apply, for example, to checking patient care equipment. A lot of times, people might assume biomedical has done that and done it correctly, but you can sometimes walk around and see equipment that has not been checked. The nurse manager may not have been made aware of performance checks. You could also check for expired meds or check the crash carts."

This movement into more sophisticated areas can be a gradual process, Homa-Lowry concedes. "I think that since it's a learning curve, my experience is to have [early FMEAs] centered around issues that are a little 'safer,' to get comfortable. For the people who will be responsible for conducting future projects, the process is time well spent, because you develop a 'train-the-trainer' mentality. When you are more comfortable with the process, you move into more significant issues. I've seen one institution revise the process for infant abduction, for example."

Another possibility, Spath suggests, is to do an FMEA on something that *could* be a problem, vs.

(Continued on page 65)

Meadville Medical Center
Performance Improvement Prioritization Matrix

Problem Area: _____

Does this meet core objectives, mission, and vision of Meadville Medical Center? ☐ Yes ☐ No

Select the appropriate points within the total possible points available for each statement.

Criteria	Total Possible Points	Points Assigned
1. **High Volume.** Process can affect large numbers? Comments: _____	5	
2. **High Risk.** Process can: a) be life threatening; b) cause harm or injury; c) cause a sentinel event; d) cause an error? Comments: _____	15	
3. **Problem Prone.** Can become a potential problem? Comments: _____	5	
4. **Low Volume, High Risk.** Can affect small numbers but potentially become harmful as noted in 2 above? Comments: _____	15	
5. **Customer Satisfaction.** Significant number of complaints from patients and family? Comments: _____	10	
6. **Compliance Issue.** Noncompliance with rules and regulations of facility, state, federal government, JCAHO/AOA, corporate compliance, HIPAA? Comments: _____	5	
Total Points	55	

SCORE	RECOMMENDATIONS
0 – 10	Continue to monitor and watch for process variation
11 – 15	Review for a potential team or task force
16 – 30	Team or task force required
>30	Immediate attention required

Signature _____ Date _____

Source: Meadville (PA) Medical Center.

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one that already *is* a problem. "However, since you're going to need medical staff and employee involvement, if you can answer the 'so what?' question, you are more apt to keep their interest and involvement.

"You can do that either by showing data on near misses within your own organization, by posing questions to employees about unsafe situations, or by going to the literature. The ideal would be to use your own data to prove you've had near misses,"she points out.

"Many organizations have near misses, so that may not be enough of a burden," Homa-Lowry counters. "You may find yourself splitting hairs between root-cause analysis and FMEA. This month, one facility looked at the fact that it was having problems with its education process. The consensus was it may be time to go back and do a failure mode," she adds.

"It's not at all difficult to motivate the staff [to address potential problems]," Pears says. "If we have a situation that's potentially harmful, we always do a root-cause analysis, and that can lead into the FMEA."

Peery contends that organizational culture is the key. "We've focused on changing the culture for several years now, and while we have accountability, we have a nonpunitive culture, so people are very happy to get involved in process-improvement activities — whatever the topic. That's my belief; if you change the culture, it's not a problem." ■

System improved heart attack care in study

Reminding clinicians about therapies boosts use

By incorporating a system of reminders, standing orders, and checklists into routine care, hospitals in Michigan significantly improved the percentage of patients receiving certain proven treatments and lifestyle counseling for heart attack patients.

After the system was put in place, there were jumps in the use of individual treatments that ranged from 5.6 percentage points to 34.8 percentage points, according to the latest phase of a study sponsored by the American College of Cardiology (ACC) in Bethesda, MD, and led by members of the Michigan ACC chapter under the direction of researchers at the University of Michigan Cardiovascular Center of the University of Michigan Health System (UMHS) in Ann Arbor.

The combined results from three studies conducted in 33 Michigan hospitals were presented at the ACC's 52nd Annual Scientific Session meeting in Chicago, March 30-April 2, 2003. The study, called ACC AMI GAP (the ACC's Acute Myocardial Infarction Guidelines Applied in Practice), seeks to find ways to help physicians and hospitals deliver the care outlined in heart attack care guidelines developed by the ACC and the American Heart Association (AHA). The guidelines are based on the best available evidence of what drugs, tests, and lifestyle changes work best for patients, preventing complications and recurrences.

The new results of the three projects conducted between 2000 and 2003 compare the care given to 1,892 heart attack patients treated at the 33 hospitals before the studies began, and 2,065 heart attack patients treated while the system was in place. The study measured use of aspirin, beta-blockers, and ACE inhibitors early and late in a

Key Points

- Significant improvements were achieved within a period of 12 months.
- A complicated, fast-paced environment taxes the best of memories.
- Professional societies are committed to developing science of engineering care.

patient's care; cholesterol tests and cholesterol-lowering drugs; and counseling on diet and smoking cessation.

These results combine the data collected in three stages of the GAP project: a pilot study in 10 hospitals in southeast Michigan, a phase II study in five hospitals in the Flint/Saginaw region of Michigan, and a phase III study in 19 more southeast Michigan hospitals, including UMHS.

All hospitals were offered a tool kit of reminders, checklists, stickers, standard orders, reference cards, and educational materials that made it easier for physicians, nurses, and patients to follow the ACC's guidelines. **(See box, p. 67.)**

Here are some of the key findings:

- Use of aspirin and beta blockers early in a patient's hospital stay increased 6.6 points and 5.6 points, respectively. Pre-discharge prescriptions for the same drugs rose 12.4 points and 6.3 points, respectively. There also was a 7.7 percentage point increase in prescriptions for ACE inhibitor drugs given before patients went home. A 9.6 percentage point jump in cholesterol tests also was seen.
- The biggest gains were in the area of diet and smoking-cessation counseling, and in prescriptions for cholesterol-lowering drugs, which rose by 14.3 points. There was a 34.8 point jump in the percentage of patients who got advice about stopping smoking, and a 21.6 point rise in the percentage who saw a dietitian or nutritionist before they went home.
- The highest percentage achieved was 94% for pre-discharge aspirin.

The very nature of the way medicine is practiced today created the rationale for the GAP project, notes **Kim A. Eagle**, MD, the Albion Walter Hewlett Professor of internal medicine and chief of clinical cardiology at the UMHS and one of the authors of the study.

"It's fair to say today's health care workers live in a very complicated, very fast-paced, very busy environment," he says. "Within that context, it's understandable that occasionally things can be unconsciously omitted in treatment. The knowledge base available in cardiology today is so enormous, it's incredibly clear that to be able to prioritize that base and be able deliver exactly the right care at a moment's notice is beyond the capability of a normal human being. Providing priorities within the key processes themselves is a way of ensuring that priorities of care are adhered to."

One of the challenges was to motivate physicians and nurses to adhere to the recommendations. "For years, being a medical doctor or nurse has been equated with a level of independence, which is understandable — making the diagnosis and designing and tailoring the therapy," Eagle explains. "But it's very hard for an individual memory to retain and keep track of everything. What the ACC and the AHA are leading and inviting hospitals and employers to do is to participate in the ongoing development of scientific methods that engineer care in such a way that the most important treatments are always remembered. It's clear these professional societies have now accepted the mantle that creating knowledge without creating the science of how that knowledge is applied is falling short of their mission. Their participation, first and foremost, is why this project is successful."

Second, says Eagle, the project involved not only national experts who helped create guidelines, but

Heart Attack Facts

Background on heart attack and heart attack treatment from the American College of Cardiology (ACC) in Bethesda, MD:

- ✔ Heart attack, or acute myocardial infarction, is a leading killer of Americans, striking 1.1 million people each year and killing about 45% of them within one year of their attacks. With recent advances in treatment and preventive measures, survival rates have improved, leaving 7.5 million American heart attack survivors alive today.
- ✔ The quality of care that patients receive in the minutes, hours, days, and months after their heart attacks varies widely from hospital to hospital, state to state, and person to person. The result: wide variation in patients' survival, complication and recurrence rates, and quality of life. Sizable variations by age, sex, race, and geographic location have been seen.
- ✔ The ACC developed its heart attack guidelines in collaboration with the American Heart Association to address such disparities. Based on solid medical evidence about the effectiveness of drugs, tests, interventions, and other techniques, and updated regularly, the guidelines serve as a "gold standard" for emergency, hospital, and follow-up care. Available on the Internet, the guidelines give recommendations for the treatments, tests, and advice that patients should get based on their age, sex, medical history, and the severity of their condition. ■

local experts — physicians and nurses who were identified as champions. "They were given the opportunity to mold the tools to a look and feel that fit their hospitals," he explains.

Finally, Eagle says, the GAP project has the involvement of the entire community, so a communitywide plan could be developed to spur improvement at all sites.

The GAP project was geared to create change within a period of one year. Here are the key steps:

- **Invitation to participate.** These came from the president of the ACC and were sent to the CEOs, the head of cardiology, the QA manager, and the project leader of cardiac care (usually a quality nurse) at each hospital.
- **Hospital selection.** "We tried very hard to accommodate as many as wanted to participate," says Eagle. "In the pilot, we could only use 10 out of 22. We wanted a diversity of urban, nonurban, teaching, nonteaching, and so on."
- **Project kickoff.** In each project, all of the team members were brought together to take advantage of their diverse talents. Collaborators from the community also were included. The program included a presentation of overall goals, introduction of team members, discussion of goals and timelines, and so on.

"We presented a global picture of our goals, but each hospital had the chance for a nurse and physician leader to present their thoughts," says Eagle.

- **Learning sessions.** Each session covered specific problems, such as how to identify patients, create an individual look for the tool kits, actually measure what's happening before and after the intervention, and get the charts created in such way that the data could be transported to the data extraction center at the Centers for Medicare & Medicaid Services.
- **Monitoring tools.** This involved how the hospitals would monitor whether the standards and tools were being used, how to get the guides to all the physicians and nurses, and how to get information sheets to the patients.
- **Re-measurement.** The teams measured adherence to key quality targets before the project started, and then after it had been up for three to six months.
- **Data analysis.** This was conducted by the Michigan Peer Review Organization.
- **Results presentation.** This was conducted not only at the ACC, but for each of the three projects a results presentation was held, to which all hospitals were invited.

"They also received their own results in a confidential, sealed envelope," Eagle notes.

He contends the GAP project is making an important statement. "We've proven that it is possible to prioritize key ingredients in AMI treatment and embed them into patient care by creating reminder mechanisms for doctors and nurses that improves overall rates," he says. "The key to improvement is to create a system that reminds us of our priorities *every time*. The use of that system is the key to our overall success."

Of course, the rate of usage varied from facility to facility. "That reflects the complexity of the care providers and the differing degrees of buy-in," says Eagle. "Remember, we tried to do something very quickly, and every institution has a biology of its own; we have to find ways of addressing those unique features, but in general, we observed that improvement breeds improvement. Even in hospitals where we did not observe the kind of improvement we wanted, I hope we saw something positive that will lead to further change."

GAP Tool Kit

Tools in the Guidelines Applied in Practice (GAP) initiative tool kit (available on-line at www.acc.org/mi/ami_gap.htm) include:

- standing orders for medication and tests;
- pocket cards of medications and guidelines for medical staff;
- clinical pathway that guides nurses through their daily activity;
- special patient information form;
- stickers for the patient's chart;
- chart that shows hospital's overall performance;
- discharge checklist for doctors or selected nurses to review with patients;
- patient education materials — written and verbal instruction on therapy and lifestyle.

Guideline-recommended therapies, tests, and counseling measured in the study include:

- aspirin in the emergency department and before discharge to prevent clotting;
- beta-blockers to reduce heart rhythm problems;
- angiotensin-converting enzyme inhibitors, to aid the heart's recovery;
- blood cholesterol tests and, in appropriate patients, drugs to lower cholesterol;
- smoking cessation counseling (smoking doubles the long-term risk of heart attack);
- diet counseling with emphasis on low-fat diets.

Source: American College of Cardiology, Bethesda, MD.

Need More Information?

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- **GAP Project web site:** www.acc.org/gap/mi/ami_gap.htm.

As for "take-home messages" for quality professionals, Eagle notes the following: "I can't overemphasize the importance of physician leadership, and of employers and insurers creating partnerships," he says. "The only way we can improve is to get together. I really believe the carrot approach is best — let's invest resources instead of pointing fingers and blaming someone else for lost opportunities. I believe in the future, we will create systems that allow us to track key priorities for high-risk, high-volume conditions, and we will have the mechanisms to provide data to care providers and patients every time. When we have done that, we will have a better health system."

Based on the success seen in the new results, Eagle says, there's momentum for the project to expand into other states and to incorporate additional care guidelines. He and his colleagues recently have helped a group of hospitals in Montana adopt the GAP tool kit, and similar programs have begun in Kansas, West Virginia, and Ohio. The concept also is taking hold overseas — hospitals in Italy have initiated a GAP project, and another effort is being planned in Spain. ■

NICU study: Best practices are not always followed

Dramatic variations in more than 13,000 cases

A new nationwide review of more than 13,000 premature and other medically complex newborns reveals a dramatic variation of care in the neonatal intensive care unit (NICU), with treatment often deviating from medical literature and leading to less than optimal outcomes for newborns and their families.

The study was sponsored by Paidos Health Management Services Inc., a Deerfield, IL-based specialist in comprehensive NICU population management. Paidos, a ParadigmHealth company, employs neonatal nurse care managers to prospectively collect and populate the Paidos database, called PROACT. "By benchmarking practices and using thoughtfully developed clinical guidelines founded in a review of the current literature and provider experience, Paidos believes the practice variation can be reduced and neonatal outcomes significantly improved," says **Alan R. Spitzer**, MD, chairman of the Paidos scientific advisory board.

Key findings of the study include:

- The medical literature recommends infants with suspected sepsis be treated with antibiotics for two to three days unless tests show a positive result, yet more than one-third of the infants studied were treated for periods of time outside of this recommendation (in some cases as many as seven days), even though test results were negative.
- Previously, physicians were reluctant to discharge infants until they reached a certain weight or gestational age. Now physicians are more likely to discharge premature infants after they have reached certain important milestones.
- There is a need for additional clinical studies on the use of certain commonly used treatments, such as inhaled nitric oxide (iNO) and metoclopramide for low birth weight babies. These drugs are often prescribed, yet few formal studies support their use, and iNO is not approved by the Food and Drug Administration for premature infants.

Findings such as these take on added significance considering the extent of the NICU industry, says **Greg Lippe**, president and CEO of Paidos. "This is a $10 billion to $15 billion industry; most insurers say that one in four admissions are NICU-related, or 350,000 to 450,000 admissions a year," he observes. Paidos' initial client base has been insurance companies. "Our staff serve and interact with the physicians and nurses at the hospitals, and they have the ability to collect information on up to 300 variables on infants, to make sure optimal outcomes are achieved," Lippe says.

The data gathering is a team effort, he emphasizes. "We view our staff as nursing executives

Key Points

- The goal of benchmarking is to reduce variances and improve outcomes.
- Treatment of patients with sepsis, low birth weight merit a closer look.
- More than 300 variables studied at more than 500 participating hospitals.

who are able to deliver excellent data *and* share information," he notes. "The data gathering has a collaborative flavor, because there's a constant interest in what the data say. Plus, our database includes *all* NICU admissions — not just the very small kids."

Lippe emphasizes that developing a good relationship with nurses across the country is critical to the collection of data and to benchmarking. "The nurses who manage and run the units allow the access to the data," he explains.

Behind the review

Why did Paidos decide to do this particular study? "It goes back to our historical commitment to achieving the highest quality outcomes for infants," says Lippe.

"At this point, we've been involved in NICU admissions in about 800 hospitals in the U.S., and we now manage about 35,000 cases or more, so studying this on an interim basis is a good way to improve outcomes on all infants. Plus, sharing information is part and parcel of what we do."

The Neonatal Practice Benchmarks study reportedly is the first of its kind to provide a comprehensive overview of current neonatology practice in the United States. The report benchmarks more than 300 clinical variables on all categories of infants admitted to 504 of the nation's more than 800 NICUs.

The report was overseen by Spitzer, who is chief of neonatology at the State University of New York at Stony Brook, and **Michael Kornhauser**, MD, Paidos' senior medical director.

Spitzer had this to say about the study's findings: "Although there is an increasing emphasis in the neonatal literature on 'evidence-based medicine,' many daily decisions are minimally supported by the literature on current practice. As a result, many neonatal decisions are made based on the local training of the physician, his or her practice experiences, the local norms of practice, and what little science is available."

The resulting variation in practice, he notes, can lead to differing, and at times, less than the most favorable outcomes for newborns and their families, as well as unnecessarily prolonged hospital stays.

One area of care that requires further improvement, based on the study's findings, is the treatment of infants with possible infection. Treating infants with antibiotics for periods of time outside of the recommendation of the medical literature, the report notes, may prove detrimental and costly, leading to the emergence of resistant bacteria that may be difficult to treat, and possibly placing other infants at higher risk.

"Clinicians and hospitals may not always know or have access to information regarding the current standard practices in neonatology," Kornhauser says. "Individual practitioners would be well served to compare their own practices to data in this report, and if significantly different from these benchmark data, to reevaluate their practices and protocols for care of their NICU infants."

One the positive side, the benchmarking data indicated promising developments regarding changing criteria for hospital discharge, especially for low birth weight infants. Previously, physicians were reluctant to discharge infants until they reached a certain weight or gestational age. Now physicians are more likely to discharge premature infants after they have reached certain important milestones, including the ability to feed and maintain a stable body temperature in an open crib, rather than age/weight-based criteria.

In addition, the report also reviewed other areas of NICU care, including feeding practices, respiratory management, and complications in the NICU.

Lippe sees significant potential benefits in sharing knowledge such as this. "We believe that, hopefully, there are some data in here that are real important," he notes.

"One that struck me personally was how infections are treated. We think we can offer some value to people, perhaps causing them to examine their current benchmarks in this and other areas," he adds. Have they established policies on certain issues raised by the study? Our experience is, there is still a lot work to be done on policy development and benchmarking; we hope this is a good first step for small NICUs and nurseries that have not had their own numbers that indicated the need to do so."

The study has been mailed to NICUs across the country, Lippe says. ■

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Center uses web images to aid diabetes treatment

Digital photos of patients' eyes evaluated

Key Points

- Routine visits transformed into "one-stop shop" for diabetes eye care.
- Partnership with BellSouth gives access to high-speed phone lines.
- In-house staff trained to use digital cameras and software.

Vanderbilt University Medical Center in Nashville, TN, is using the Internet and high-speed telephone lines to transmit digital photographs of diabetes patients' eyes to centralized evaluation centers, where technicians then look for evidence of disease.

The university has signed a contract with the Department of Veterans Affairs (VA) to provide services to at least 5,800 diabetes patients at the VA hospitals in Nashville and suburban Murfreesboro, according to Vanderbilt Ophthalmic Imaging Center.

Vanderbilt, which already has a camera at two public health clinics in Nashville and recently received a grant from the Frist Foundation for expansion to another clinic, will place specialized cameras at both VA hospitals. Photographs from those five locations will travel via Internet to Vanderbilt's evaluation center, which operates in donated space in the BellSouth Tower in downtown Nashville.

"We're in a strategic partnership with BellSouth Corp.," explains **Lawrence Merin**, RBP, FIMI, assistant professor of ophthalmology at Vanderbilt.

"They provide us with DSL lines for some of the closer clinics; the transmission speed is increased to 768 kilobits per second," he explains. Since the transmissions are quite extensive — 35 megabytes per patient visit — it's not practical to send them in 'real time,' while the patient is actually being examined. Rather, the in-house clinic staff uploads the information, and the next morning Merin and his colleagues examine and analyze the photos and transmit the results to the primary care physician.

It was a kind of meeting of the minds that brought Merin and Vanderbilt together. "I used to have a faculty position at the University of Arkansas, where I became interested in the whole issue of having patients with diabetes show up at the doorstep of an eye clinic way too late," he says.

It was there that he had a life-changing experience. "I had a 23-year-old lady come in who had had a vitreous hemorrhage, and we put in lots of intense work to try to save her," says Merin. "When last I saw her, she had a red-tipped cane. When she showed up at our clinic that first time, it was the first time she had ever had an eye exam. This didn't have to happen, and that made me angry."

Merin knew the technology was available to make eye exams easier and more effective; it just took someone with the will to make the investment. "Not long after that, Vanderbilt gave me a call and said they wanted to look at using technology to improve eye exams," he says. "Their new department chairman, who came there about 2½ years ago, had a high interest in preventative ophthalmology."

The Vanderbilt system was designed to be operated not by a professional photographer, but by in-house staff trained right at the clinic — medical assists, secretaries, and so on. "This becomes an internal decision," notes Merin. "I train them, and after a few hours of practice, they are on their way."

The equipment basically is "off-the-shelf stuff," Merin says. The cameras are made by Canon, and the software, Digital Health Care, comes from Cambridge, England. "The turnkey camera setup is in the area of $25,000, including software at the camera, then you need routers and servers, which in our case are provided by BellSouth."

In-house staff not only acquire the images, but also talk with patients about risk factors for diabetes and what patients can do to be proactive.

Once the images are transmitted and read, Merin and his team offer suggestions to the primary care physician. Basically, they will either inform the physician that:

1. **The findings are within normal limits,** or there is very mild disease present, so the physician probably can wait another year before performing another eye exam on the patient.
2. **The situation is a little more severe.** Either it is urgent to get a referral, because the situation is deemed to be sight-threatening, or it is non-urgent; *i.e.*, the patient has glaucoma, which is considered to be a comorbid condition with diabetes, Merin explains. "We apply some very rigorous grading parameters," he notes.

Need More Information?

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Ideally, every physical exam of every diabetes patient in the area would include an eye exam. Currently, however, it is up to the physicians and the participating institutions to make the decision to take advantage of this new technology. "The physicians know it's there, and they don't really have a problem with using it, but it requires them to think differently about how to manage patients with chronic problems," Merin says.

The benefits of the technology are clear to Merin. "For one thing, when the diabetes patient goes to routine health care venues, this becomes a truly one-stop shop for specialist care without needing a specialist," he says. "They won't be at an eye clinic, but they'll get the same high-level monitoring of their condition. It makes the whole throughput more efficient for both the doctor and the patient. The patient doesn't have to worry about how to get there, or even how to pay, because our relationship is with the clinic — not the patient. What's more, the secret to good eye health for diabetics is regular monitoring of the retina; the earlier you find problems, the more treatable they are. With this technology, we can close the gap."

Can any institution do what Vanderbilt is doing? Yes and no, says Merin. "Basically, anybody can buy this equipment and learn how to shoot the pictures," he admits. "But we may be one of only a few institutions with the potential to do this, because we are part of an academic institution and we have a high-powered retinal staff providing quality assurance to the program. Using the camera is easy; the question is, what do you do once you've shot the pictures? We have a long history here of looking at diabetic images of the retina." Still, he says, "Any place in the country or the world could do it as long as they had some validated method of analyzing the results." ■

E-diaries help migraine sufferers predict attacks

'Early warning system' may lead to treatments

A multicenter study of 97 patients found that 72% of those who reported premonitory (before the attack) symptoms (i.e., fatigue, difficulty concentrating, and a stiff neck) experienced a migraine headache within 72 hours at least half the time. This ability to predict migraines could one day lead to the development of preemptory treatment, says one of the lead researchers, and may even help improve the treatment being received by current sufferers.

The study's results were published in the March 25, 2003, issue of *Neurology,* a publication of the American Academy of Neurology.

"The significance of the paper comes down to this: For years, there has been the perception that people with migraine could predict headaches based on premonitory symptoms. But some raised questions as to whether this was not so much prediction as patients recalling the symptoms as warnings when they looked back," notes **Richard B. Lipton**, MD, of the departments of neurology, epidemiology, and social medicine at Albert Einstein College of Medicine in Bronx, NY. "Our objective was to determine if the group could actually predict headaches, so we would know with certainty that the warning features were prospectively recorded. What we found was, those who thought they could predict migraines were actually very good at it," he explains.

Patients with recurring migraine were assigned a hand-held electronic diary and asked to record any nonheadache symptoms on a daily basis for three months. During that time, 97% of them recorded some type of symptom during the premonitory phase. The most common symptoms reported were tiredness (72%); difficulty with concentration (51%); and stiff neck (50%).

"We even asked them to estimate the likelihood they would get a migraine. Those who predicted an 80% chance, for example, actually got about

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that percentage," Lipton recalls.

The long-term clinical implication of these findings is that it might be possible to develop preemptory treatments, he adds. "Right now, there are two kinds of treatment: preventive treatment and acute treatment, which occurs after the attack begins."

Preventive treatments currently are taken every day, whether the patient feels a migraine coming on or not. "The problem is, most days you don't really need it," Lipton says. "The problem with acute treatments is that they take a couple of hours to work, which means a couple of hours of acute suffering for the patient."

With preemptive treatment, he continues, you would get the benefits of both acute and preventive treatment.

"There are a number of candidate preemptive drugs that are either being developed or contemplated," Lipton observes. "This diary study says there really is a group of people who can predict migraine and might be good candidates for such drugs."

Does that mean things won't improve for migraine sufferers until those new drugs are developed? Not necessarily, says Lipton.

"First, there are external trigger factors that vary from person to person, such as chocolate, red wine, soft cheeses, stressful events," he offers. "People can prevent some migraines themselves by avoiding triggers or by practicing a relaxation method."

Relaxation techniques such as meditation have been used for a long time and have worked "pretty well," Lipton says. "This study lends this approach support and creates opportunities for behavioral preemptive strategies," he says.

Most of the current preventive medicines have effects that only develop over a period of weeks, so they probably could not be used as preemptive treatments, says Lipton.

"There is one preemptive strategy that's been used effectively," he adds. "Some women are very regular with their periods; if they have regular cycles, they can either take drugs like naproxen [Aleve], naratriptan [Amerge], or frovatriptan [frova]. The interesting thing about these drugs is that they are ordinarily acute treatments."

However, studies have shown them to be effective in pre-menstrual women, Lipton says. "If I had a patient who could predict migraine, I might try one of these as preemptive therapy, even though we do not have the science yet to support it."

In other words, "we are probably years away from new drugs, but not from new applications of *approved* drugs," he says. ■